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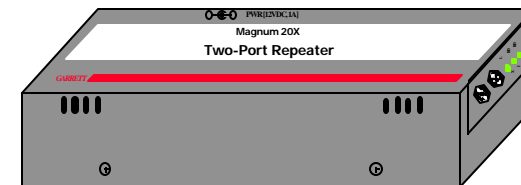
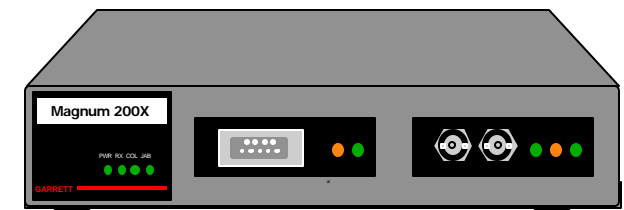
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Magnum 200X

Two-Port Repeaters



Installation and User Guide

Magnum 200X

Two-Port Repeaters Installation and User Guide

Part #: 84-00022 (R04/99)

Trademarks

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Velcro is a trademark of Velcro U.S.A.

UL is a registered trademark of Underwriters Laboratories

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Important: Magnum 200X Two-Port Repeaters contain no user serviceable parts. Attempted service by unauthorized personnel shall render any and all warranties null and void. If problems are experienced with a Magnum 200X, consult Section 5, Troubleshooting, of this User Guide.

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Federal Communications Commission**Radio Frequency Interference Statement**

This equipment generates, uses and can radiate frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference

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The Magnum Line

ETHERNET CONNECTIVITY PRODUCTS

"DESIGNED AND MANUFACTURED IN THE USA"

OVERVIEW

Garrett Communications offers the Magnum™ line of Ethernet LAN connectivity products with industry-standard functionality. Magnum products are available worldwide through OEMs, network integrators, representatives, and international distributors.

Fiber Switches, 10/100 Quad-Series, Mixed-Media, 8 & 16-ports

Dual-Speed 8-port, 16-port Stackables, 10/100 auto-sensing/port

Fiber Hubs, Dual-speed Mixed-Media, for fiber-to-the desktop

Stackable Hubs, SNMP Optional

10Mb series and 100Mb series, both w/ optional port modules

Switching Hubs, unmanaged 500-series and managed 10Mb 5000s

Two-Port Switches

100Mb RJ-45 port +10 /100Mb port, or +FDX fiber port

Workgroup Hubs

10Mb series and 100Mb series, both w/ optional port modules

Personal Hubs, 100Mb series

8-port dual-speed, 6-port @100 with one switched 10/100Mb

Personal Hubs, 10Mb series

8-port +AUI, stackable to 5 high, +optional BNC or fiber port

8 or 9-port and 4 or 5-Port Personal Hubs, w/ man. up-link sw.

Media Converters, including multi-mode and single-mode fiber

10 Mb, all media combinations, incl. Fiber/twisted pair/BNC

100Mb, all fiber port types, incl SC, ST, MTRJ, VF45, FX/SX

The "X-line" of configurable Mixed Media 10Mb products:

Stackable Concentrators, SNMP optional, 13-Ports

Mini-Concentrators, 7 Ports, Repeaters, 2-Ports

Repeater Port Modules (RPMs), 6 types for Ethernet

media

Bridge Port Modules (BPMs), 4 types, for segment

isolation

Workgroup Bridges, 10Mb series

Fan-Outs, 10Mb series

4 and 8 Port Deluxe, 2 and 4 Port Standard Models

Transceivers, 10Mb series

Mini-Transceivers and Coax Models, All Types

April' 99

Data Rate: 10 Mbits / sec

Partitioning: Enforced after 32 consecutive collisions.

Reconnect: Occurs after 512 bits of error-free transmission.

Network Standards

Ethernet V 1.0/V2.0 IEEE 802.3: 10BASE-T, 10BASE5, 10BASE2, 10BASE-FL & FOIRL, and DTE

(The Magnum 200X Two-Port Repeaters are physical layer standard Ethernet products, and operate independently of all software.)

Maximum Ethernet Segment Lengths

DTE (AUI Drop Cable)	- 50 m (164 ft)
10BASE-T (twisted pair)	- 100 m (328 ft)
Shielded twisted pair	- 150m (492 ft)
10BASE2 ThinNet (BNC)	- 185 m (607 ft)
10BASE5 ThickNet	- 500 m (1,640 ft)
FOIRL multi-mode Fiber optic	- 1 km (3,281 ft)
10BASE-FL multi-mode Fiber optic	- 2 km (6,562 ft)
Single-mode Fiber optic	- 10 km (32,810 ft)

Connectors

200X: Two Magnum RPM ports on the front, AC power in rear.

RPMs available with standard 200X models:

RPM-TP: Shielded female RJ-45 with up-link switch

(Note: ***Shielded 10BASE-T connectors accept either unshielded or shielded wiring plugs for standard twisted pair media wiring.***)

RPM-BNC: ThinNet (BNC) connector with internal termination switch

RPM-AUI: D-Sub 15-Pin Female with slide lock

RPM-FST: Multi-mode fiber 10BASE-FL ST (dual "twist lock") connector

Ambient Temperature: 32° to 120° F (0° to 50°C)

Storage Temperature: -5° to 140°F (-20°to 60°C)

Ambient Relative Humidity: 10% to 95% (non-condensing)

Packaging

200X:

Enclosure: High strength steel.

Suitable for wiring closet shelf or desktop mounting.

(Rack-mount brackets are available as an option)

Repeater Port Module Slots: 2

Dimensions: 5.4 in D x 8.5 in. W x 1.75 in. H

(13.7 cm x 21.6 cm x 4.45 cm)

Weight: 2.5 lbs (1.1 Kg)

Port Slot Cut-out: 2.2 in. x .75 in. (5.6 cm x 1.9 cm)

Cooling method: Convection

Magnum 200X Power Supply (Internal)

AC Power Connector: IEC-type, male recessed, rear of chassis

Input Voltage: 90 to 260 vac (auto-ranging)

Input Frequency: 47 to 63 Hz (auto-ranging)

Power Consumption: 15 watts max for the 200X Repeater unit

LED Indicators on Chassis

200X:

PWR - Power, Green LED, steady ON indicates there is AC power.

RX - Receive, Green LED, blinks to indicate network activity, data being received from any of the RPMs.

JAB - Jabber, Amber LED, illuminates when jabber condition (illegal packet size) is detected on any port; affected port is partitioned

Warranty

Three years, return to factory

Made in

USA

1.2 Specifications - Repeater Port Modules (RPMs)

RPM Type :	BNC	AUI	DTE	Fiber-mm	Fiber-sgl.m	TP*
Front Access	yes	yes	yes	yes	yes	yes
Connector Type	BNC-f	DB-15 f	DB-15 m	Fiber-ST	Fiber-ST	RJ-45
Partition (PART)LED	yes	yes	yes	yes	yes	yes
Receive (RX) LED	yes	yes	yes	yes	yes	yes
LINK LED	n.a.	n.a.	n.a.	yes	yes	yes
Switch on Face Plate		yes**	n.a.	n.a.	n.a.	n.a.

yes***

“Fiber-mm” is multi-mode cable, normally used for 10BASE-FL installations, up to

2.0km.

“Fiber-sgl.m” is single-mode cable, used for distant installations, up to 10.0Km.

* The RJ-45 connector is shielded; it accepts RJ-45 eight-pin plugs for unshielded and shielded twisted pair wiring.

** Internal termination switch for BNC, no "T" connector is required.

*** MDI-X (Media Dependent Interface - Crossover) switch for RJ-45 uplink, no crossover cable is required.

1.3 Ordering Information

Magnum 200X-TT	2 TP ports
Magnum 200X-BF	1 BNC and 1 fiber port
Magnum 200X-AF	1 AUI and 1 fiber port
Magnum 200X-TF	1 TP and 1 fiber port
Magnum 200X-FF	2 fiber ports

Magnum 200X Spare Parts

Magnum 200X	Base chassis with 2 RPM slots, internal auto-ranging P.S
Magnum RPM-BNC	Module with 1 BNC connector + internal term sw, uses 1 slot
Magnum RPM-TP	Module with 1 RJ-45 connector + up-link sw, uses 1 slot
Magnum RPM-AUI	Module with 1 AUI connector with slide locks, uses 1 slot
Magnum RPM-DTE	Module with 1 DTE connector with lock posts, uses 1 slot
Magnum RPM-FST	Module with 1 Fiber ST dual connector, uses 1 slot
Magnum RPM-FSM	Module with 1 Fiber SMA dual connector, uses 1 slot

Note: All RPMs are interchangeable for use with other Magnum X-Line products and for bonus port configuration of Magnum Stackable and Workgroup Hubs.

Garrett Communications reserves the right to change specifications, performance characteristics and/or model offerings without notice.

2.0 INTRODUCTION

2.1 Inspecting the Package and Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier of any damage which you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and ensure that the items listed below are included.

Remove the items from the shipping container. Be sure to keep the shipping container should you need to ship the unit at a later date. To validate the product warranty please complete and return the enclosed Product Registration Card to Garrett Communications as soon as possible.

In the event there are items missing or damaged, contact the party from whom you purchased the product. If the unit needs to be returned, please use the original shipping container if possible. Refer to Section 5, Troubleshooting, for specific return procedures.

2.2 Product Description

: the Magnum 200X offers models of two port repeaters. Magnum 200X Two-Port Repeaters expand a network by extending individual Ethernet segments. Where standard distance limits are not sufficient, and where different media types need to come together in one Ethernet link, Magnum 200X Repeaters are ideal. They support connections to all standard Ethernet media types.

Each Magnum 200X unit is a complete operational unit with internal power supply, all enclosed in a compact, rugged steel enclosure. The media connectors and the chassis status LEDs are all conveniently accessed from the front. The unit is easily installed and is suitable for wiring closet shelf, vertical wall, or desktop mounting.

Magnum 200X Two-Port Repeaters provide full repeater functionality per IEEE 802.3 specifications and in compliance with Ethernet V1.0/2.0 standards. Magnum 200Xs operate as homogeneous-media repeaters (two segments of the same media type connected) or as mixed-media repeaters (two segments of different media type connected). Using two RPMs, two full-length segments of all media types are supported by each 200X model and configuration. The family of Magnum 200X Two-Port Repeater models supports all

module (RPM) to provide either 10BASE2, 10BASE5, 10BASE-T, 10BRL, or 10BASE-T connectivity. The individual RPMs are used for one Ethernet segment each, and provide full IEEE 802.3 repeater functionality supporting a full length segment. Individual RPMs are equipped

with a single media interface connector. Any RPM can be installed in either slot of the Magnum 200X chassis.

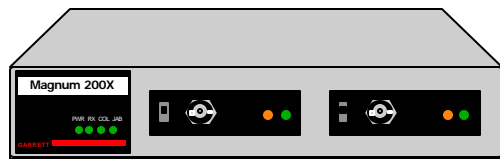


Figure 2.2.1: Magnum 200X

To simplify media connections, each media interface port is accessible from the front of the unit. All LEDs common to the 200X unit and all individual port LEDs are front-mounted. No rear access is required except for the AC power cord.

The internal power supply is auto-ranging to handle any AC power type worldwide. Power input may range from 90 to 260 vac, with a frequency rating of 47 to 63 Hz. The unit is equipped with a rear mounted IEC-type recessed male AC power connector. (When shipped for use in areas other than 115 vac, a power cord will not be included). The 200X unit is convection-cooled for silent operation.

The Magnum 200X base unit features Power (PWR), Receive (RX), Collision (COL), and Jabber (JAB) LED status indicators located in the front of the unit. These LEDs provide a visual assessment of the operational condition and aggregate network activity at the unit, and are in addition to the LEDs on each individual RPM.

2.3 Magnum 200X - Repeater Port Modules (RPMs)

For standard 200X models, there is an option of four different Repeater Port



Magnum RPM Cards : RPM-BNC, RPM-AUI, RPM-DTE

RPM-FST, RPM-FSC, RPM-TP

Each of the individual RPMs are described in detail in this section.

NOTE: Due to the larger physical size of the Magnum Bridge Port Modules (BPMs), the standard Magnum 200X **cannot** be configured with a BPM. A physically larger 200X chassis is available by special order. As an alternative, the Magnum 30X Workgroup Bridge, is available in five standard configurations for bridge-isolating a workgroup segment to improve performance.

10BASE2 coax connector. This RPM performs full IEEE 802.3 repeater functionality and is used for 10BASE2 ThinNet



Magnum RPM-BNC

(commonly referred to as BNC) connections.

The RPM-BNC module is designed with a special switch -selectable internal termination function that eliminates the need for a "tee" connector and a 50 ohm terminator. To take advantage of internal termination, the slide switch should be in the "DOWN" (or right-side) position. In this configuration, the 10BASE2 segment is directly attached to the BNC port where it is internally terminated. When the switch is in the "UP" (or left-side) position, the BNC port requires a "tee" connector (not supplied) and a 50 ohm terminator for proper termination. Certain applications may require a "tee" connector, used as a tap, to allow the 10BASE2 coax segment to continue on past the RPM-BNC connection.

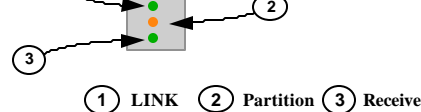
The RPM-BNC module includes one partition (PART) and one receive (RX) LED, which are visible from the front. The PART LED flashes AMBER to indicate that the segment has been automatically partitioned. As soon as normal transmission resumes, the segment will be automatically re-established. The RX LED illuminates GREEN intermittently to indicate data is being received.

Important Note: For the RPM-BNC Termination Switch -
DOWN (or right): Internally Terminated
UP (or left): Requires "T" Connector.

2.3.2 RPM-TP (Twisted Pair)

The Magnum RPM-TP card supports Ethernet twisted pair segments of any standard length. It is equipped with a single RJ-45 connector. The RJ-45 connector is

the need for a special twisted pair crossover cable. With the switch in the UP (or LEFT) position, the RPM-TP port is used for up-link connections (i.e., a connection to another repeater or hub typically.)



Magnum RPM-TP

When used for segments going to workstations and other user device connections, the switch should be in the DOWN (or RIGHT) position. The LINK LED is particularly useful in choosing the proper position for the up-link switch. If the LINK LED is illuminated, the switch is set properly! If not, change the switch setting.

The RPM-TP will support 10BASE-T unshielded twisted pair wiring (UTP) environments with maximum segment distances up to 100m (325 ft.), or shielded twisted pair wiring (STP) of 150m (500 ft.). This module is designed with internal transceiver functionality. In addition to PART and RX (same as RPM-BNC, Section 2.3.1), the RPM-TP has a LINK LED to indicate proper connectivity with the remote device.

Important Note: For the RPM-TP MDI-X Crossover Switch -
DOWN(or Right) for workstations and user connections.
UP (or Left) for Up-Link connections to other hubs, etc.

The RJ-45 pins normally (TP crossover switch DOWN or RIGHT) are per the standard for hub-to-user twisted pair wiring: 1 = receive+, 2 = receive-, 3 = transmit+, 6 = transmit-, other pins not used. When the TP crossover switch is UP or LEFT, the pins of the RJ-45 port are per the standard for up-links using twisted pair wiring, i.e., the transmit and the receive pairs are exchanged: 1 = transmit+, 2 = transmit-, 3 = receive+, 6 = receive-, other pins not used.

is used to provide connectivity with a 10BASE5 (ThickNet) backbone or to any AUI segments. A transceiver is required when connecting to a ThickNet segment and the RPM-



Magnum RPM-AUI

AUI supports this convention. The RPM-AUI is also a "universal" Ethernet media interface as it may be used with a variety of different mini-transceivers to provide connectivity to any media type.

The RPM-AUI card is equipped with Partition (PART) and Receive (RX) LEDs which function the same as the identical LEDs on the RPM-BNC (Section 2.3.1 above).

The Magnum RPM-AUI card is also used for connecting Ethernet devices using standard AUI cabling. In this situation, it is important to consider the AUI segment length or distance to the attached device.

The maximum transmission distance between a backbone transceiver equipped with an AUI connector and the Magnum RPM-AUI card will vary. When an AUI cable is used to connect the Magnum RPM-AUI directly to a backbone transceiver, the maximum AUI segment length is allowed. If the Magnum RPM-AUI is connected to a transceiver that has been cascaded from another transceiver, the maximum AUI segment length is reduced.

According to Ethernet standards, the maximum distance from the transceiver AUI connector and the attached device (Magnum RPM-AUI) is 50m (165 ft.). The AUI segment maximum length is reduced in cascaded configurations. See the following note.

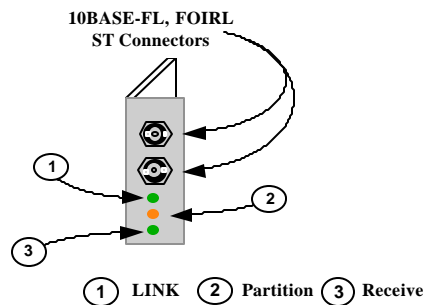
Important Note: The maximum transmission distance is decreased by 6m (20 ft.) for every additional level of network transceiver device "dropped" or "cascaded" from the original backbone transceiver tap.

6	Voltage Common	15	Control Out Circuit B
7	Control Out Circuit A	SHELL	Protective Ground
8	Control Out Circuit Shield (conductive shell)		
9	Control In Circuit B		

- NOTES:**
- 1) Voltage Plus (pin #13) and Voltage Common (pin # 6) use a single twisted pair in the AUI cable.
 - 2) Pins 4, 8, 11 and 14 may be connected to pin #1.

2.3.4 RPM-FST (Fiber ST, Twist-lock Connector)

The Magnum RPM-FST is a multi-mode fiber optic module equipped with a dual ST-type connector. It functions as an IEEE 802.3 full repeater to support 10BASE-FL and FOIRL network segments. When used for 10BASE-FL segments, this module supports fiber optic transmission distances up to 2000m. For FOIRL applications, it supports fiber segments of up to 1000m in length. The RPM-FST includes full



Magnum RPM-FST

transceiver functionality and does not require an external transceiver device. In addition to Partition (PART) and Receive (RX) LEDs, a LINK LED indicates connectivity.

NOTE: The RPM-FST circuit board contains a six pin jumper which controls the intensity of the transmitted signal. By default, the jumper is placed across pins 1 & 2. The jumper may be set as follows, to accommodate distances of up to 4 km:

(See Figure and Table on following page.)

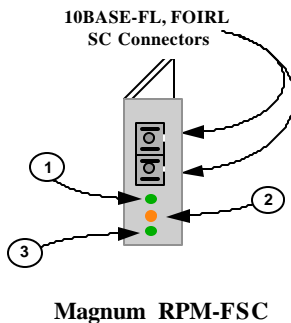
When distances of less than 2 km are needed, the jumper should be placed across pins 1 and 2.

* When fiber cable distances of more than 2 km are selected, the minimum cable length must also be increased, as shown in the table above.

2.3.5 RPM-FSC (Fiber SC, Snap-in Connector)

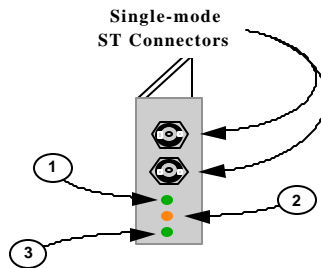
The Magnum RPM-FSC is also a multi-mode fiber optic repeater module, similar to the RPM-FST. It has the same LEDs indicating port partitioned (PART), receive activity (RX), and link operational (LINK). It has the same jumper settings for extra distance in certain circumstances.

While the functionality of the these two modules is the same, the RPM-FSC is equipped with an SC-type "snap-in" connector instead of an ST-type "twist-lock" connector.



2.3.6 RPM-SMF (Single-mode Fiber)

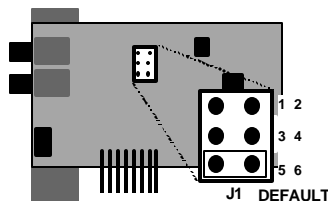
The Magnum RPM-SMF is a single-mode fiber optic module equipped with a dual ST-type connector. It functions as a full repeater to support single-mode fiber networks. The RPM-SMF supports fiber optic transmission distances of up to 10 Km. The RPM-SMF includes full transceiver functionality and does not require an external transceiver device.



is only to be placed across pins 5 & 6. Others are not used.

JUMPER ACROSS DISTANCES SUPPORTED

1 - 2	0 - 10 km
3 - 4	not used
5 - 6	not used



Note: Be sure to use single-mode fiber optic cable with this module.

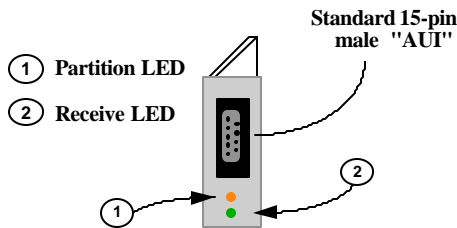
Single-mode fiber has a smaller diameter than multi-mode fiber (2/15 - 8/60 microns for single-mode, 50/125 or 62.5/125 microns for multi-mode, where xx/xx are the diameters of the core and the core plus the cladding respectively).

2.3.7 RPM-DTE

The Magnum RPM-DTE is a module equipped with a 15-pin male DTE connector with lock posts. (The RPM-DTE is a mating connector for the RPM-AUI which has a 15-pin female connector and slide locks. The pin assignments of the two are the same). The

RPM-DTE card is designed to support direct

connections (no transceiver required) using AUI drop cables to any device that is equipped with an AUI port. Examples of such devices include servers, routers, bridges, hubs, and UNIX workstations.



Magnum RPM-DTE

Users may expand network distances while retaining the media of choice with these models.

■ **Six Models for Mixed Media**

Since the Magnum 200X port connectors are modules, the units are ideal when different media types need to be brought together at a repeater unit.

Two-Port models are available with all combinations of BNC, AUI, TP, and Fiber. These mixed-media models ensure standard signals and up-to-full-length distance on each network segment, accommodating changes in media preferences as networks change over time.

■ **RPMs (Repeater Port Modules) for All Standard Ethernet Media**

Multiple RPMs support all of the various IEEE 802.3 standards including, 10BASE-FL, FOIRL, 10BASE2, 10BASE5 and 10BASE-T.

■ **Fiber Ports Meet 10BASE-FL Specification, 2000 meters distance**

The Magnum X-line RPMs meet the new "FL" specification for 2 Km distance. They also support the older FOIRL specification rated at 1 Km.

■ **Front-Mounted Connectors and LEDs on 200X**

The installation of Magnum 200X units only requires front access for network connections. Similarly, status LEDs are all readily visible from the front for ease of monitoring operational status over time. An internal universal power supply allows any Magnum 200X unit to be used throughout the world.

of homogeneous-media repeater models support each standard Ethernet media type, and allow users to expand network distances while retaining the wiring media of choice. As many as four repeaters may be connected in series to connect users at the extremities of 5X the standard segment distance while still adhering to the Ethernet "four repeater" rule.

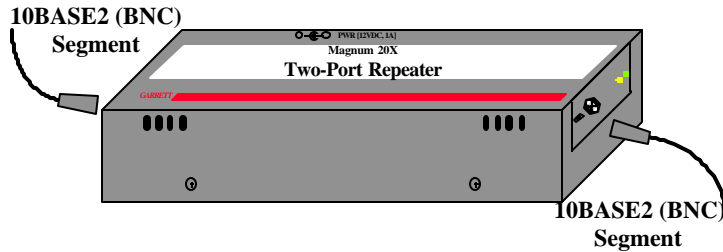
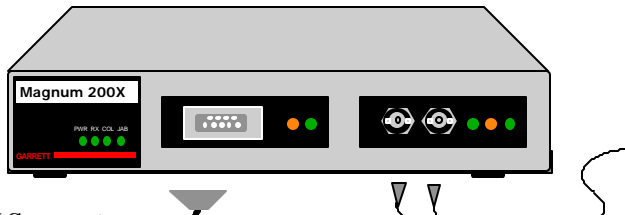


Figure 2.5.1: Magnum 200X extend segments of same media type.

Since the Magnum 200X connectors are modules, the units are ideal when **different media types** need to be brought together at a repeater unit. As media type preferences change over time and as networks expand to new distances with system growth, the requirement to convert media types while ensuring standard signals on both network segments is increasingly common. The Magnum 200X meet this requirement with all media-combination types available.



convenience outlet for a simple installation. For rack-mounting, two 200X units fit side-by-side in a standard rack-width space. (Rack-mounting brackets for 200Xs may be optionally purchased, see the Magnum Spare Parts Price List. The same brackets fit the Magnum 200X Repeaters and the Model 1008 Workgroup Hubs).

The Magnum 200X units are suitable when network segment extensions are needed in offices, labs, hallways and storage areas.

3.1 Locating the Magnum 200X Two-Port Repeater

The location of the Magnum 200X Two-Port Repeater is dependent on the physical layout of the network and the area to be served. The unit should be set-up in a location that will accommodate easy and equal access to planned network devices and/or segment connections.

Locate an AC receptacle that is within six feet (2 meters) of the intended Magnum 200X repeater site. The rugged steel case of the Magnum 200X will protect it from accidental damage in a wiring closet or in a workplace setting. Keep an open area around the unit so that convection cooling can occur while the unit is in operation.

3.1.1 Magnum 200X Table-Top / Shelf Mounting

The Magnum 200X unit has four rubber feet to provide stability while not scratching finished surfaces. It is typically shelf-mounted either in a wiring closet or in an open area. To conserve shelf space, it may be desirable to mount several units on top of each other. If so, this may be readily done as the Magnum 200X's steel case is strong.

Should vertical mounting of the unit (such as on a wall surface) be desired, operation and cooling are not impaired but no brackets for vertical mounting are provided by Garrett Communications.

3.3 Connecting Ethernet Media

The Magnum 200X Two-Port Repeater is specifically designed to support connections for any two Ethernet segment media types within a single unit. This is accomplished by using a family of Repeater Port Modules (RPMs). The various media types supported along with the corresponding IEEE 802.3 standards and connector types

Fiber (mm ¹)	FOIRL	ST or SMA	RPM-FST, RPM-FSM, BPM-FST
Fiber (mm ¹)	10BASE-FL	ST or SMA	RPM-FST, RPM-FSM, BPM-FST
Fiber (sgl.m ²)	*	ST	RPM-SMF

¹ mm = multi-mode

² sgl.m = single-mode

* not currently standardized by IEEE

3.3.1 Connecting Twisted Pair (RJ-45, Unshielded or Shielded)

The following procedure describes how to connect a 10BASE-T twisted pair segment to the RJ-45 port on the RPM-TP. The procedure is the same for both unshielded and shielded twisted pair segments.

1. Using standard 10BASE-T media, insert either end of the cable with an RJ-45 plug into the RJ-45 connector of the RPM-TP. Note that, even though the RPM-TP connector is shielded, either unshielded or shielded 10BASE-T cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device.
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established. If the LINK LED is not illuminated, change the setting of the up-link switch. If this does not help, ensure that the cable is connected properly and is not defective.

The Magnum RPM-TP is equipped with a up-link slide switch to accommodate repeater-to-repeater connections without special cross-over connectors.

NOTE: When installing a Magnum 200XX-TT Workgroup Bridge, the up-link switches of both connectors should have the same setting (both left or both right). When installing a Magnum 200X with only one twisted pair port, you will normally set the up-link switch to the DOWN (or RIGHT) position, however this is dependent on your network configuration (see step 3 above).

3.3.2 Connecting ThinNet 10BASE2 (BNC)

3.3.3 Connecting ThickNet 10BASE5 (AUI)

Using the steps below as a guide, attach a new or existing 10BASE5 ThickNet drop-cable directly to the AUI connector on the RPM-AUI port.

1. Plug the male end of the cable into the female AUI connector on the RPM-AUI card.
2. Engage the AUI connector slide lock to insure maximum connectivity.
3. Connect the opposite end of the cable into a network AUI port. (This could be a network backbone transceiver, a hub or fan-out with an AUI backbone port, or an AUI module in a concentrator.)

The Magnum RPM-AUI card may also be used for connecting to other Ethernet devices using standard AUI cabling. In this type of situation, it is important to consider the AUI segment length to the attached device, including any cascading. (See Section 2.2.3 for detailed information on the RPM-AUI card, connector pins, and cable lengths.)

3.3.4 Connecting Drop Cable 10BASE5 (DTE)

Using the steps below as a guide, attach the 10BASE5 drop-cable directly to the DTE connector on the RPM-DTE port.

1. Plug the female end of the cable into the male DTE connector on the RPM-DTE card.
2. Engage the AUI connector slide lock (on the cable) to insure maximum connectivity.
3. Connect the opposite end of the cable into a network AUI port. (This could be a server, router, bridge, hub, or UNIX workstation.)

3.3.5 Connecting Fiber Optic 10BASE-FL and FOIRL (ST-type, "Twist-Lock")

The following procedure applies to FOIRL and 10BASE-FL applications using an RPM-ST card with ST-type fiber connectors. (The primary difference between FOIRL and 10BASE-FL for users is the maximum distance allowed. 10BASE-FL is used for a fiber

3. Connect the Transmit (TX) port (light colored post) on the Magnum RPM-FST to the Receive (RX) port of the remote device. Begin with the color-coded strand of the cable for this first TX-to-RX connection.
4. Connect the Receive (RX) port (dark colored post) on the RPM-FST to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this.
5. The LINK LED on the front of the RPM-FST will illuminate when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the Port Module connector to remedy this situation.

3.3.6 Connecting Fiber Optic (SC-type, "Snap-on")

The same five-step procedure as for fiber ST-type applies to FOIRL and 10BASE-FL applications using an RPM-FSC card used with SC-type fiber connectors. Follow the five steps as described in the paragraph above.

When connecting fiber media to SC connectors, simply snap on the square male connector into the female SC jack of the device until it clicks and secures.

3.3.7 Connecting Single-Mode Fiber Optic (SMF)

When using the RPM-SMF, be sure to use single-mode fiber cable. Single-mode fiber cable has a smaller diameter than multi-mode Fiber cable (2/15 - 8/60 microns for single-mode, 50/125 or 62.5/125 microns for multi-mode where xx/xx are the diameters of the core and the core plus the cladding respectively). Because of this, single-mode fiber allows full bandwidth at longer distances, and may be used to connect nodes up to 10 Km apart.

The same five-step procedure for multi-mode fiber ST-type applies to single-

all required RPM modules and media connectors installed. There may be cases where a different RPM connector is desired, making it necessary to exchange one RPM type for another. **The replacement procedures described in the next two sections should only be performed by a trained technician.**

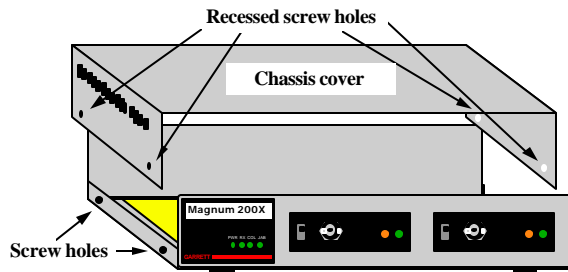
3.4.1 Exchanging RPMs in the Magnum 200X

STOP!!!

**Be sure the power cord is unplugged
from the chassis before attempting to remove
and/or replace an PM card.
Failure to do so may result in damage to the unit
and will void the warranty.**

1. Chassis Cover Removal

Remove the four screws located on the sides of the unit (two per side). Once removed the chassis cover is easily lifted off the chassis base, and the interior of the unit is exposed.



Removal of Magnum 200X chassis cover

2. RPM Cable Disconnection

Each RPM of the 200X is connected to the main



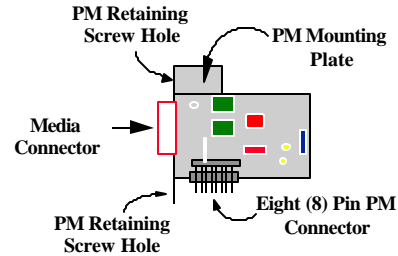
Each RPM is secured to the front of the 200X chassis with two screws. Once these screws have been removed, the RPM can be easily lifted out of the unit.



Retaining screw removal

4. RPM Card Installation

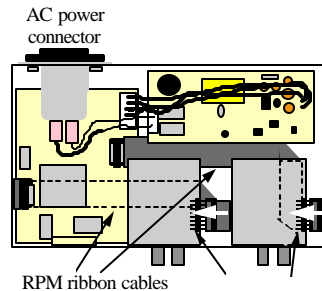
Hold the card parallel to the bottom of the 200X, with the RPM media connector facing the front of the unit, and the RPM connector pins facing to the right. Secure the RPM using the two retaining screws. Next, align the RPM pins and the RPM cable connector, and gently push the cable connector onto the connector pins.



Side view of RPM card

5. Chassis Cover Replacement

Replace cover on chassis and secure with the four screws.



Top view of 200X - Insertion of RPM cards

This section describes the functionality and operation of the Magnum 200X Two-Port repeaters.

4.1 Repeater Functionality

The Magnum 200X units operate as mixed-media or homogeneous Ethernet repeaters. Both types are compliant with IEEE 802.3 specifications and supports all IEEE defined media, including 10BASE-T, 10BASE-FL, FOIRL, 10BASE2, and 10BASE5. The following describes the basic functionality of the Magnum 200X Two-Port Repeater.

1. Repeater Functions: Each RPM port operates in conjunction with the controller functions of the Magnum 200X base unit, functioning together as a fully compliant Ethernet repeater. Each 200X unit counts as a single repeater.

2. Collisions: When a collision is detected at a port other than the original receiving port, it generates a jam pattern to the other ports. When a collision signal is detected at a receiving port, it generates a jam pattern to the other port. The sequence of jam signals depends on the sequence and location of collisions.

3. Partitioning and Re-connection: A Magnum 200X will automatically disconnect (partition) any segment (port) when 64 consecutive collisions occur or after 6.5 ms of continuous transmissions. Network integrity is checked every 800 ms and segment (port) reconnection occurs after a 512-bit packet is transmitted without error.

4. Link Status: The Magnum 200X RPMs indicate link integrity for fiber optic and twisted pair segments. Broken cables or a loss of power at any point in twisted pair and fiber segments will turn off the LINK LED indicator on the associated RPM.

between 47 and 63 Hz, and will consume no more than a maximum of 15 watts. The power connector is located on the back of the unit. In order to power down the unit, simply unplug the power cable from either the wall socket, power strip or the power connector on the back of the unit.

When connecting various Ethernet media, there is no need to power down the unit. Individual segments of any media type can be connected or disconnected from RPMs without concern for AC power-related problems or damage to the unit.

4.4 Chassis LEDs

The Magnum 200X is equipped with four LEDs located on the front of the chassis unit. These LEDs include Power (PWR), Receive (RX), Collision (COL) and Jabber (JAB). They are used to provide visual indication about the operational condition and traffic activity of the unit and its associated RPM ports.

Magnum 200X chassis unit

<u>LED</u>	<u>Description</u>
PWR	Illuminates GREEN to indicate that the unit is receiving power.
RX	GREEN, ON when data is being received on one or more RPM ports.
COL	Flashes YELLOW to indicate a collision has occurred.
JAB	Illuminates AMBER to indicate a jabber condition has occurred.

In addition to the chassis LEDs of the 200X, each RPM card features a set of status LEDs, dependent on the media type supported. (See Section 2.2).

operation is also straightforward and is discussed in Section 4.0.

Should problems develop during installation or operation, this section is intended to help locate, identify and correct these types of problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of the procedures described in this section, or if the Magnum 200X product is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact Garrett Communications Customer Support.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the unit, refer back to the Installation Section of this manual. Also check to make sure that the various components of the network are inter-operable.
2. Check the cables and connectors to ensure that they have been properly connected and the cables/wires have not been crimped or in some way impaired during installation. (About 90% of network downtime can be attributed to wiring and connector problems.)
3. Make sure that the power cord is properly attached to each unit. Be certain that the AC power cord is plugged into a functioning electrical outlet. Use the PWR LEDs to verify the unit is receiving proper power.
4. If the problem is isolated to a network device other than the Magnum 200X product, it is recommended that the problem device is replaced with a known good device. Verify whether or not the problem is corrected.
5. If the problem continues after completing Step 4, above, contact your supplier from whom you purchased the product for assistance, or Garrett Communications

- c. The components involved in the problem
 - d. Any particular application that, when used, appears to create the problem
2. An accurate list of Garrett Communications equipment model(s) with serial number(s). Include the date that you purchased the equipment.
 3. It is useful to include other network equipment models and related hardware, including personal computers, workstations, terminals and printers; as well as the various network media being used.
 4. A record of changes that have been made to your network configuration prior to the occurrence of the problem. Changes to system administration procedures should all be noted in this record.

5.3 Return Material Authorization (RMA) Procedure

All returns for repair must be accompanied by a Return Material Authorization (RMA) number. To obtain an RMA number, contact Garrett Communications Customer Support at (510) 438-9071 (office hours: 8AM - 5PM Pacific Standard Time) or email on the Internet to *support@garrettcom.com*. When calling, please have the following information readily available:

- Name and phone number of your contact person.
- Your Company Name
- Shipping Address
- Product Name
- Serial Number (or Invoice Number)
- Packing List Number (or Sales Order Number)
- Date of installation
- Failure symptoms, including a description of the specific problem

Garrett Communications will carefully test and evaluate all returned product. If the problem or condition cannot be duplicated, the unit will be returned as:

Should you need to ship the unit back to Garrett Communications, please follow the these instructions:

1. Package the unit carefully. It is recommended that you use the original container. Units should be wrapped in a "bubble-wrap" plastic sheet or bag. Retain all of your cables and connectors, and this Installation Guide.

CAUTION

Do not pack the unit in Styrofoam "popcorn" type packing material. This material may cause electro-static shock damage to the unit.

2. Clearly mark the Return Material Authorization (RMA) number on the outside of the shipping container.
3. Ship freight prepaid. Garrett is not responsible for return shipping charges.
4. Ship the package to:

GarrettCom, Inc.

47823 Westinghouse Drive

Fremont, CA 94539

Attn.: Customer Service

Appendix A: Warranty Information

Garrett Communications warrants its products to be free from defects in materials and workmanship for a period of three (3) years from the date of shipment by Garrett Communications.

During this warranty period, Garrett Communications will repair or, at its option, replace components in the products that prove to be defective at no charge other than shipping and handling, provided that the product is returned pre-paid to Garrett

B1.0 SPECIFICATIONS - FOR MAGNUM 210X TWO-PORT REPEATERS

Power Supply (Internal 48 VDC Option)

DC Power Connector: 3 terminals: “-“, “GND”, “+”

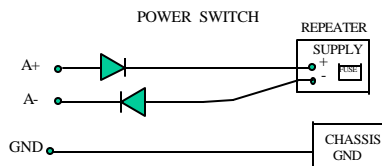
Input Voltage: 36 - 70 VDC (auto-ranging)

Power Consumption: Model 210X: 8 watt typical, 15 watts max.

With the exception of the power supply, all specifications and functions of Magnum 210X-48VDC models are identical to Magnum 200X listed in the main manual.

B2.0 48V DC POWER OPTION, THEORY OF OPERATION

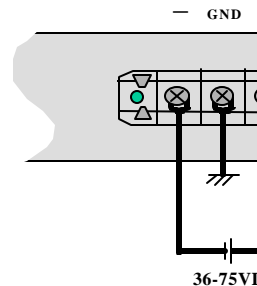
The 48VDC power option is designed using diodes inside on each DC power input line behind the two external power connection terminals, so that the power from an external source can only flow into the repeater. This allows the repeater to operate only whenever DC power is correctly applied to the two inputs. It protects the repeater from incorrect DC input connections. An incorrect polarity connection, for example, will neither effect the repeater, nor its power supply internally, nor will it blow the fuse in the internal power supply.



B3.0 APPLICATIONS

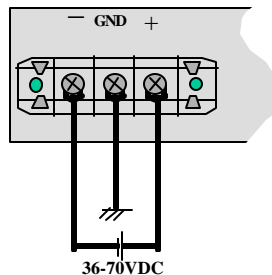
Magnum 210X repeaters are easily installed in a variety of applications where 48 VDC power is used as the primary power source. The 48VDC power configuration provides an Ethernet networking solution utilizing a special power supply in hubs with a proven track record.

The solution is particularly useful in the telecommunication industry, where it is common for facilities to operate on 48VDC power. Such companies include regular and



This section describes the installation of the 48 VDC power source leads to the 48 VDC power terminal block on the Magnum 210Xs. (see figure below).

**Figure B4.1: 48 VDC Terminal Block on
Magnum 210X-48VDC**



The 48 VDC terminal block on the Magnum 210Xs is located on the front of the unit and is equipped with three (3) screw-down lead posts. The leads are identified as negative (-), positive (+), and chassis ground (GND). The actual connection procedure is very straightforward. Simply connect the leads to the Magnum unit, beginning with ground. Ensure that each lead is securely tightened.

B4.1 UL Requirements

1. *Minimum 14 AWG cable for connection to a Centralized DC power source.*
2. *Fastening torque of the lugs on the terminal block: 9 inch pound max.*
3. *Centralized DC Power Source cable securement, use at least four cable ties to secure the cable to the rack at least 4 inches apart with the first one located within 6 inches of the terminal block.*

B5.0 OPERATION

Operation of the Magnum 210Xs with the optional 48VDC power supply is identical to that of the standard AC-powered models.

B6.0 ORDERING INFORMATION

